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Ermis

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[54] **LADDER WITH AUXILIARY SUPPORT**

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[51] **Int. Cl.**[6] **E06C 1/38**

[52] **U.S. Cl.** **182/172**; 182/107

[58] **Field of Search** 182/172, 107; 248/200.1

[56] **References Cited**

U.S. PATENT DOCUMENTS

468,987	2/1892	Fowler .	
1,890,423	12/1932	Teagarder .	
2,051,420	8/1936	Renholdt	248/200.1
2,997,127	8/1961	Wojtowicz	182/172
3,508,628	4/1970	Conrad	182/172
3,786,900	1/1974	Olsen	182/172
3,901,354	8/1975	Grebausky	182/172
5,379,861	1/1995	Amacker	182/187

FOREIGN PATENT DOCUMENTS

219262	7/1924	United Kingdom	248/200:1

Primary Examiner—Alvin C. Chin-Shue
Attorney, Agent, or Firm—G. Turner Moller

[57] **ABSTRACT**

A ladder of the pivoted or leaning type includes a support pivoted for movement between a stowed position parallel to the ladder frame and an arcuately extended support position. The support includes telescoping members biased toward an axially extended position away from an axially retracted position. A lug mechanism prevents retracting movement of the telescoping members when the support is being used to stabilize the ladder. The lug is mounted for axial movement to disable the mechanism and allow the telescoping members to retract into an axially stowed position. A J-slot is used to hold the telescoping members in the stowed position.

10 Claims, 2 Drawing Sheets

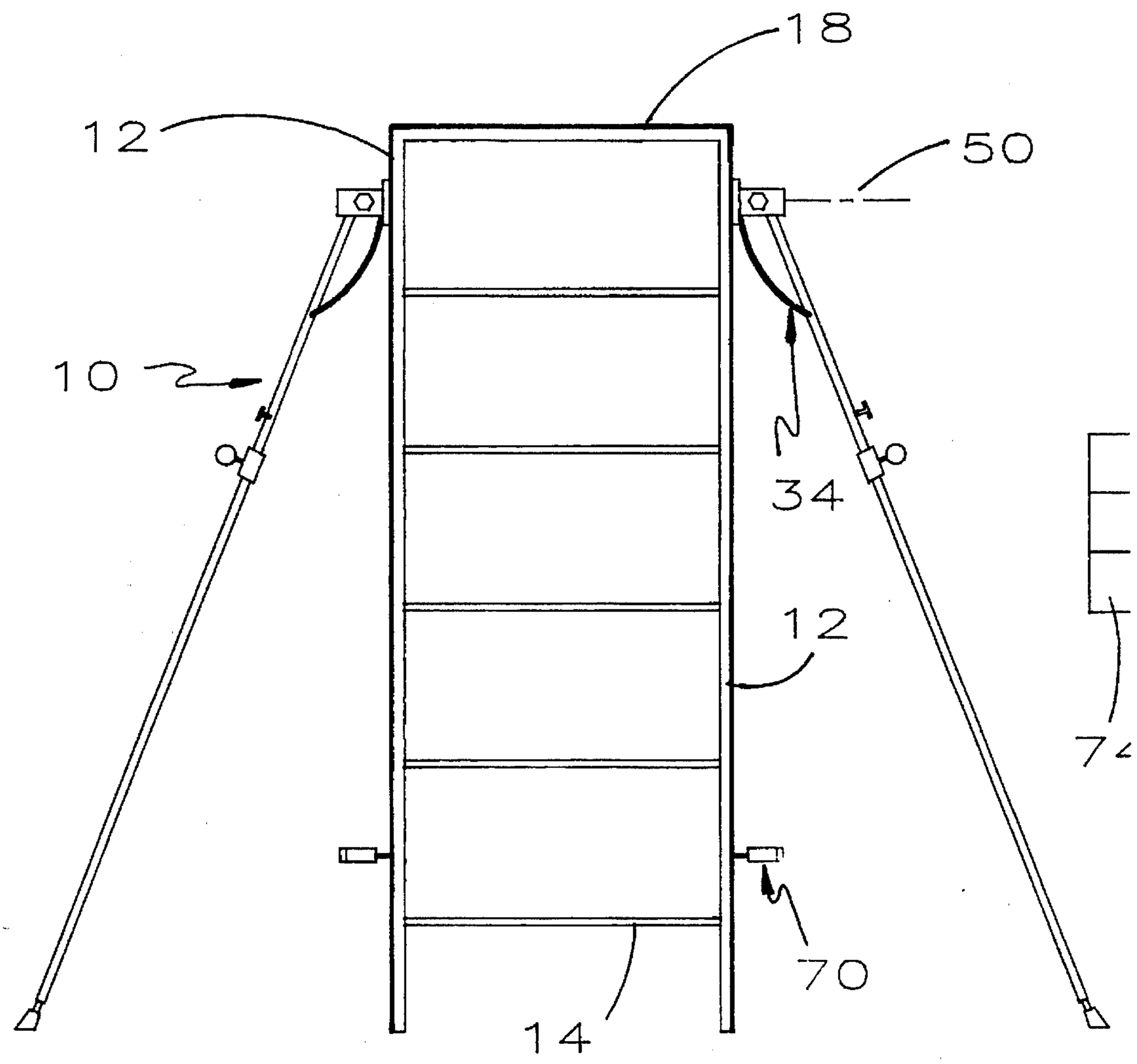

FIG. 1

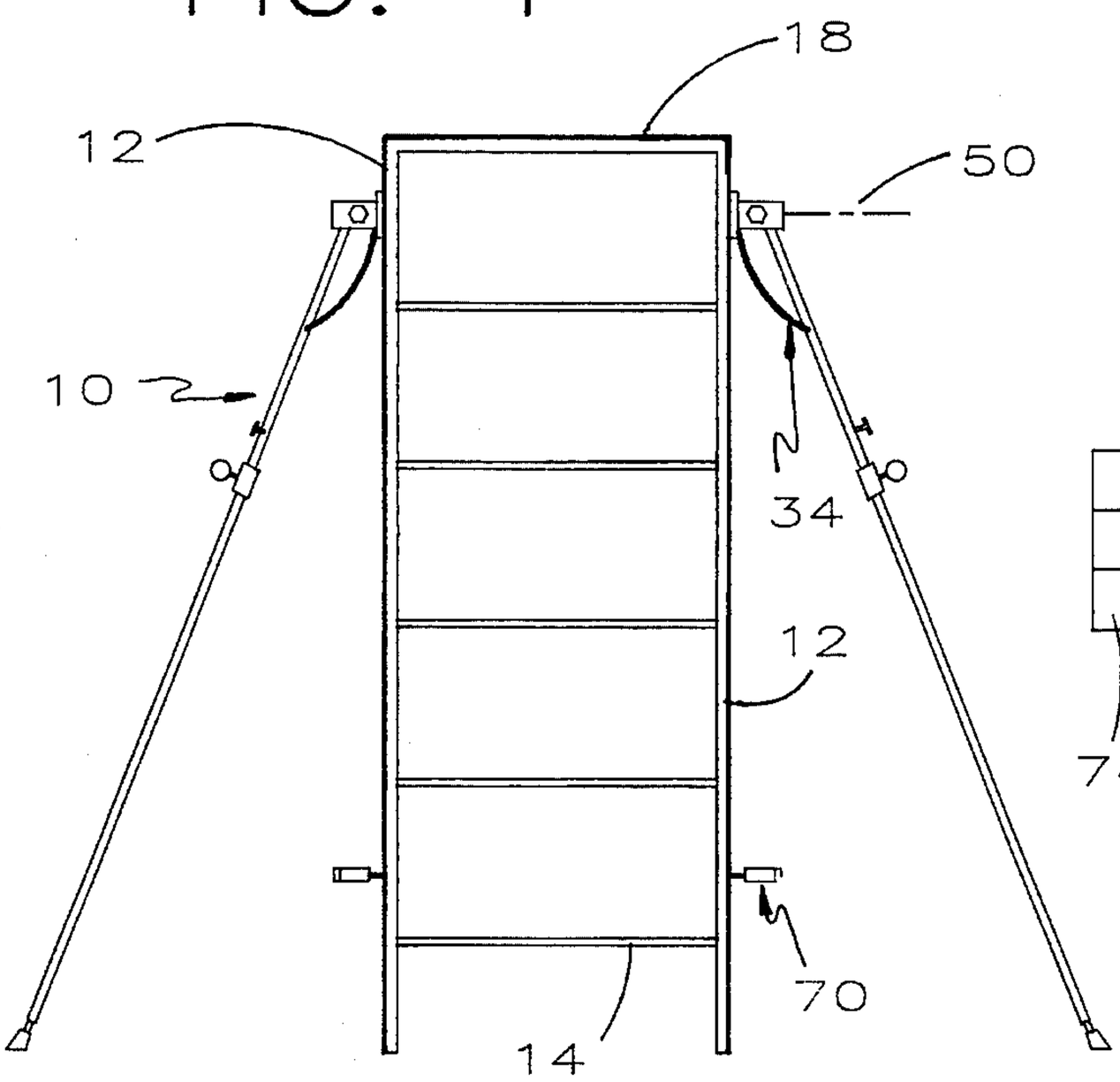

FIG. 5

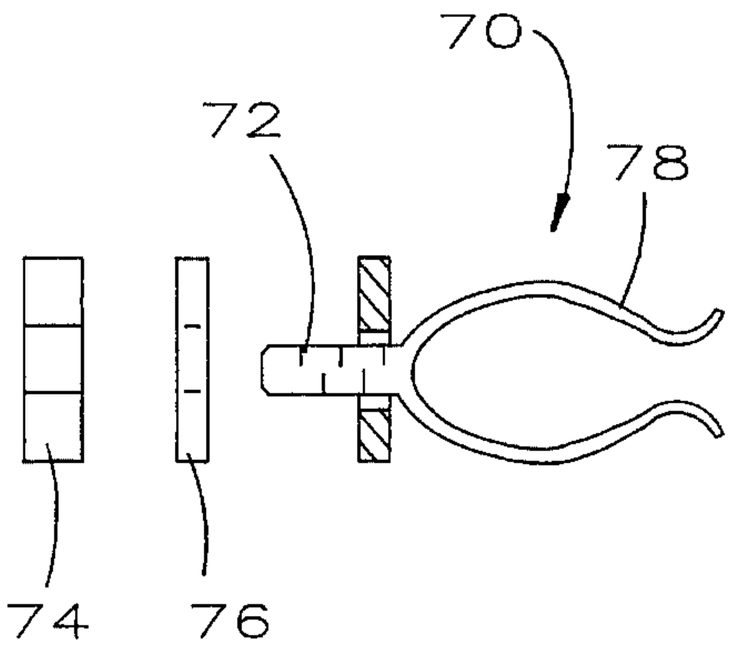

FIG. 2

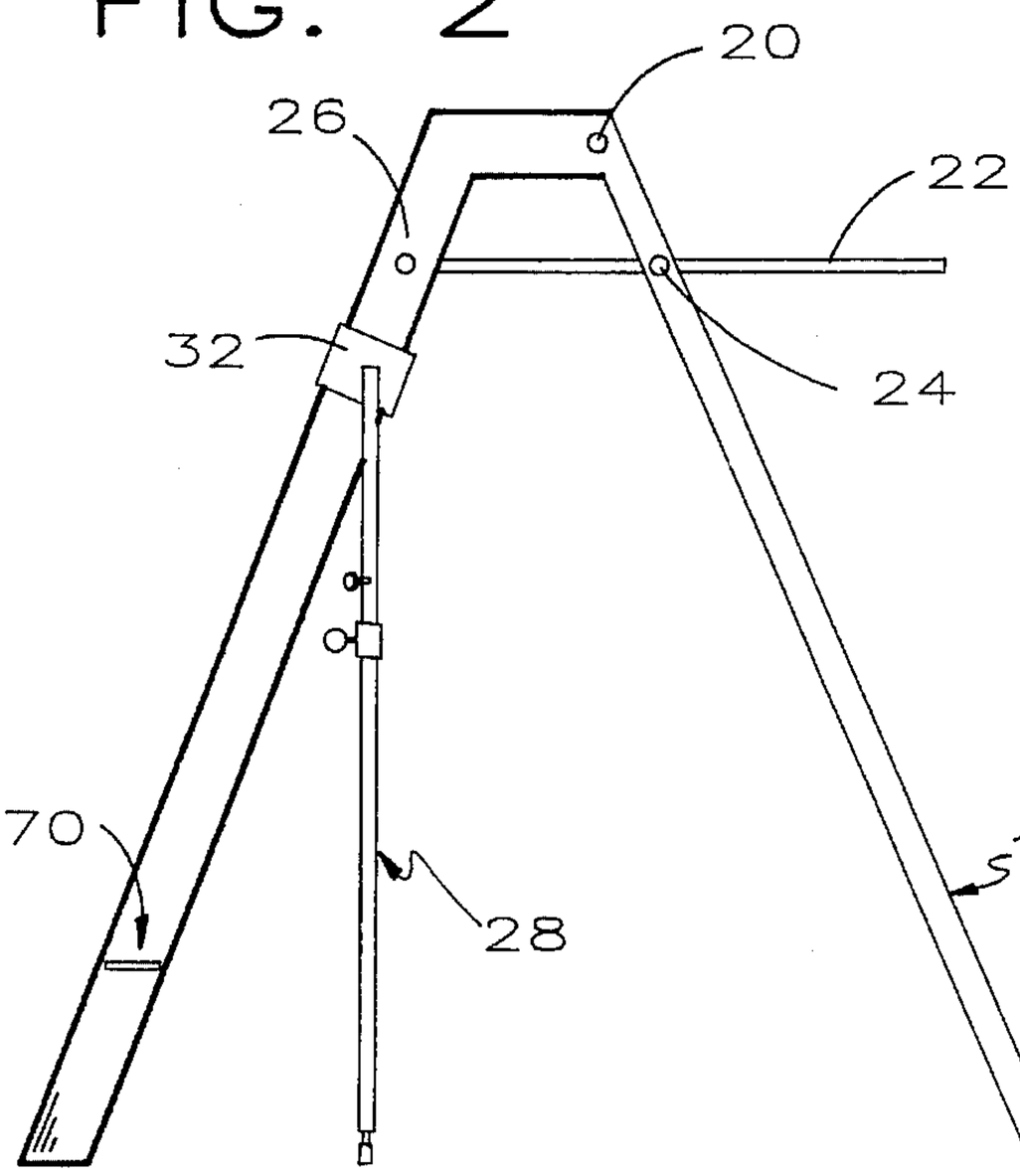

FIG. 6

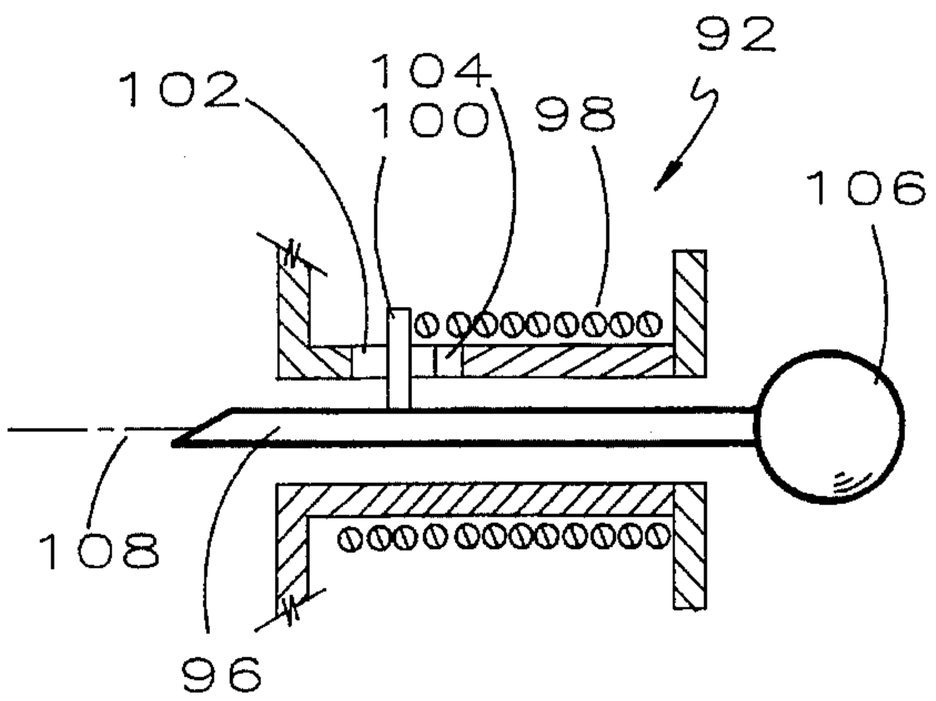

FIG. 3

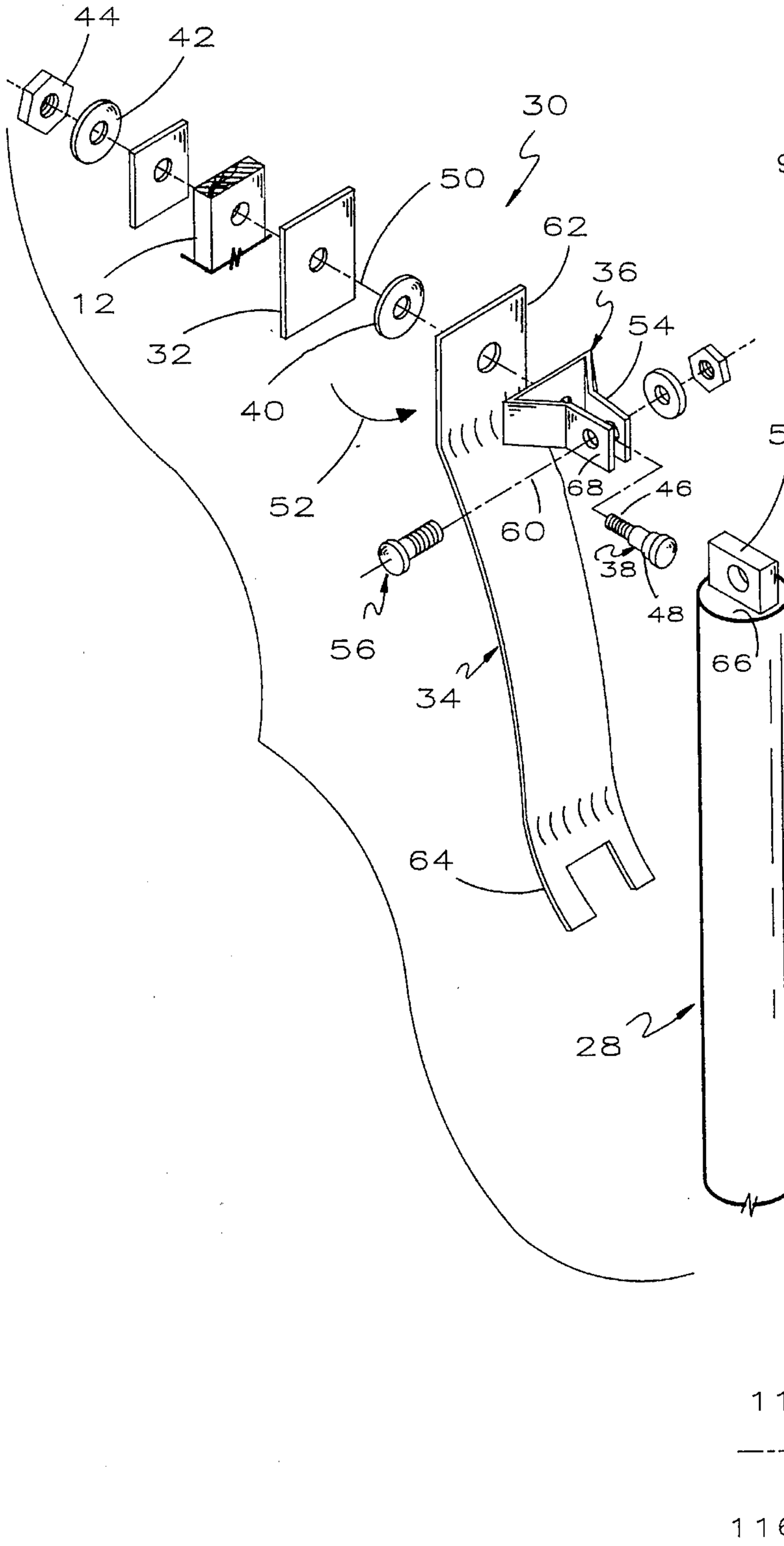
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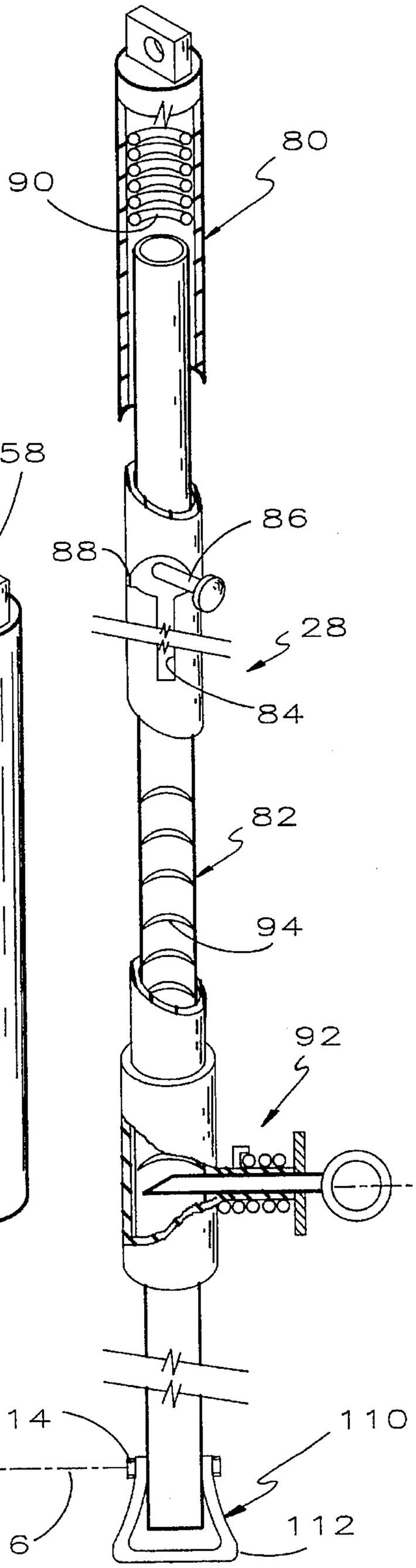
FIG. 4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LADDER WITH AUXILIARY SUPPORT

This invention relates to a ladder with an auxiliary support lending added stability to the ladder.

BACKGROUND OF THE INVENTION

Ladders tend to be unstable for a variety of reasons which are inherent in their design and use. To be practical, ladders must be portable and thus lightweight. Most ladder induced injuries are caused by the ladder shifting relative to the underlying support surface, such as may occur when the ground surface is uneven or soft. Relatively few injuries occur from simple tipping of folding ladders because the area of the base is surprisingly large. Usually, tipping is caused by an irregularity in the underlying surface or some softness in the underlying surface as the user applies weight to the ladder. It is accordingly not surprising that auxiliary props or supports have been applied to ladders for the purpose of increasing stability.

A typical auxiliary support includes a strut pivoted to the ladder, typically near the top in a folding ladder or near the middle in a straight or leaning type ladder. The strut is pivoted for movement between a stowed position adjacent the ladder frame and an extended position defining an acute angle with the ladder. Often, the auxiliary support can be telescoped, i.e. extended or retracted in an axial direction, to contact the underlying ground surface and provide additional stability. It is to this type device that this invention most nearly relates. Typical auxiliary supports for ladders are found in U.S. Pat. Nos. 2,997,127 and 3,901,354. Other disclosures of interest are found in U.S. Pat. Nos. 468,987 and 1,890,423.

SUMMARY OF THE INVENTION

A ladder of this invention provides increased stability with minimum attention and effort by the user. A ladder, such as a folding ladder or a straight ladder of the type to be leaned against an immovable object, is modified by pivotally attaching an auxiliary support to the ladder frame. The support is of an extendable and retractable type having a spring for extending the support until it reaches an underlying ground surface and means locking the support against retracting movement. This allows the support to automatically keep in contact with the underlying ground surface during any rocking or wiggling movement of the ladder caused by the user and retain the ability to support a load. Means are provided for unlocking the support, untelescoping it to a retracted position and retaining it in the retracted position.

It is an object of this invention to provide a ladder having improved stability.

A further object of this invention is to provide a ladder having one or more pivoted supports having means biasing the support toward an extended position and means locking the support against movement toward a retracted position.

Another object of this invention is to provide a ladder of improved stability which is easy to use, requiring minimum effort by the user.

These and other objects of this invention will become more fully apparent as this description proceeds, reference being made to the accompanying drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a folding ladder of this invention;

FIG. **2** is a side view of the ladder of FIG. **1**;

FIG. **3** is an exploded isometric view of the bracket connecting the auxiliary support of this invention to the ladder;

FIG. **4** is a front view of the auxiliary support of this invention, certain parts being broken away for clarity of illustration;

FIG. **5** is a side view of a device to attach the auxiliary support to the ladder in a stowed position; and

FIG. **6** is an enlarged cross-sectional view of the lug mechanism used in the auxiliary support of FIG. **5**.

DETAILED DESCRIPTION

Referring to FIGS. **1** and **2**, a conventional ladder **10** is illustrated as of the folding type and includes a pair of rails or frame members **12** having a series of steps **14** therebetween. A leg assembly **16** is pivoted to a top step **18** by a connection **20**. A paint bucket shelf **22** is pivotally connected to the leg assembly **16** and the rails **12** by a pair of connections **24**, **26**. Those skilled in the art will recognize the ladder **10**, as heretofore described, as being typical of modern folding ladders.

Improved lateral stability for the ladder **10** is provided by a pair of auxiliary supports or legs **28**. As shown best in FIGS. **2** and **3**, the legs **28** are pivotally mounted on the rails **12** by a bracket assembly **30** shown best in FIG. **3**. The bracket assembly **30** includes a support plate **32** abutting the ladder rail **12**, a spring **34** and a generally U-shaped member **36** connected to the rail **12** by a bolt **38**, washer **40**, lock washer **42** and nut **44**. The bolt **38** includes a threaded. shank **46** and an enlarged smooth section **48**. The spring **34** and the bracket **36** are received on the smooth section **48** and are thus pivotally mounted for limited arcuate movement about an axis **50** as shown by the arrow **52** while the threaded shank **46** and the washer **40** rigidly captivate the support **32** to the ladder rail **12**.

The U-shaped member **36** provides a pair of side walls **54** having aligned openings therethrough. A fastener assembly **56** includes a second bolt having a ferrule head and a threaded shank, a washer and a nut for pivotally attaching the upper end **58** of the leg **28** to the U-shaped member **36** for arcuate movement about the bolt axis **60**.

The spring **34** is of the leaf variety having an upper end **62** captivated between the U-shaped member **36** and the support plate **32**. The spring **34** is bent and bowed to provide the desired flexibility and includes a forked lower end **64** receiving and straddling the leg **28** near the upper end thereof. It will accordingly be seen that the leg **28** is spring biased for arcuate movement away from a stowed position adjacent the rail **12** to a supporting position shown in FIG. **1**.

An important feature of the connection shown in FIG. **3** is it limits the outward pivotal movement of the leg **28** to a predetermined acute angle shown in FIG. **1**. When the leg **28** is released from the ladder rail **12** as more fully explained hereinafter, the spring **34** biases the leg **28** until a shoulder **66** on the leg **28** abuts the outer edge **68** of the underside of the walls **54**. When this occurs, further outward pivotal movement of the leg **28** is prevented.

To retain the rail **12** in the stowed position, a fixture **70** is provided as shown in FIGS. **1** and **5**. The fixture **70** comprises a threaded shank **72** which may be connected to the rail **12** by a suitable nut **74** and lock washer **76**. A generally U-shaped receiver **78** provides a pair of spring metal arms having an opening there-through slightly less than the O.D. of the leg **28**.

As shown in FIG. **3**, the legs **28** each comprise an upper or outer tubular member **80** telescopingly receiving a lower or inner tubular member **82**. An important feature of the ladder **10** and the leg **28** is that it automatically seeks a position of maximum stability. When the leg **28** is released from its fixture **70**, the spring **34** biases the leg **28** outwardly as far as is allowed by the shoulder **66** and wall **54**. When released for extending movement, the inner tubular member **82** automatically extends toward the underlying ground surface to find a position of maximum stability. If the ladder **10** later shifts or tilts, the inner member **82** that moves away from the ground automatically extends to a position where it contacts the underlying ground surface and provides stability.

To these ends, the tubular members **80**, **82** allow unimpeded sliding movement toward an extended supporting position, provide means for biasing the inner member **82** outwardly toward the extended supporting position, provide means for locking the inner member **82** against retracting movement so it can support a load at the extended position and provide means for manually unlocking the inner member **82** so it can be retracted and moved to its retracted or stowed position.

It will be seen that the inner tubular member **82** slides outwardly relative to the outer member **80** in an unimpeded manner throughout a range allowed by an elongate slot **84** which may be of any desired length but is usually between six inches and one foot long. A handle or pin **86** connects to the inner tubular member **82**, extends through the longitudinal slot **84** and controls the maximum amount of movement of the inner member **82** relative to the outer member **80**. One or more short J-Slots **88** intersect the long slot **84** for purposes more fully explained hereinafter. A spring **90** biases the inner member **82** in an extending direction as allowed by the slot **84** and handle **86**.

The members **80**, **82** provide a ratchet or lug mechanism **92** preventing retracting movement of the inner tubular member **82** so the leg **28** can support a load. To this end, the inner tubular member **82** provides a series of spaced teeth or notches **94** and the outer tubular member **80** provides a moveable lug **96** for engaging the teeth **94** and supporting the load. The lug **96** provides a wedge shaped end so the teeth **94**, in the direction of extending telescoping movement of the members **80**, **82**, act to cam the lug **96** radially outward against a spring **98** which normally biases the lug **96** into engagement with the teeth **94**. The lug **96** thus provides a projection **100** extending through an elongate slot **102** having a short perpendicular slot **104** communicating therewith. The slots **102**,**104** accordingly provide a J-slot arrangement. The lug **96** includes a handle or eye **106** for retracting the lug **96** and rotating it about an axis **108** for positioning the projection **100** in the offset slot **104** and thereby positioning the wedge shaped end of the lug **96** out of engagement with the teeth **94**. This allows the inner member **82** to retract relative to the outer member **80** so the leg **28** can be stowed.

The bottom of the inner member **82** provides a pivoted foot **110** comprising a U-shaped member **112** and a threaded fastener **114** allowing relative pivotal movement about an axis **116**.

It is much preferred to retract the inner member **82** relative to the outer member **80** when stowing the leg **28** in the fixture **70**. To this end, the handle **86** is advanced toward the short or J-slot **88** thereby compressing the spring **90**. The handle **86** is rotated into the J-slot **88** thereby locking the inner member **82** in a retracted position relative to the outer member **80**.

It will accordingly be seen that the members **80**, **82** are mounted for unimpeded sliding movement from an axially retracted position to an axially extended position as allowed by the length of the elongate slot **84**. The spring **90** pushes the inner member **82** toward the extended position so any time the foot **110** tends to come out of engagement with the underlying ground surface, the spring **90** advances the inner member **82** toward the underlying surface. This moves one of the teeth **94** past the lug **96**. When load is again applied to the foot **110**, the lug **96** engages one of the teeth **94** and supports the load applied to the leg **28**. It will also be seen that the handle **106** and J-slot **102**, **104** comprises means manually operable by a user for disabling the lug mechanism **92** by moving the wedge shaped end of the lug **96** out of engagement with the teeth **94**. This allows the inner member **82** to move toward its retracted position.

The ladder **10** is normally stowed with the inner member **82** retracted with the handle **86** being in the short slot **88** and the inner member **82** received in the fixture **70**. To use the leg **28**, the handle **106** is turned so the lug **96** is capable of engaging the teeth **94** in load supporting relation and the handle **86** is turned into alignment with the slot **84**. The leg **28** is pushed out of the fixture **70** by the user and the spring **34** swings the leg **28** away from the ladder **10** toward an angled supporting position shown in FIG. **1**. The spring **34** biases the leg **28** about the axis **60**. If the bracket **36** were rigid with the ladder rail **12**, the only movement allowed would be in a plane perpendicular to the ladder rail **12**. Instead, the bracket **36** is free to move about the axis **50** as suggested by the arrow **52** so the leg **28** can move rearwardly of the ladder rail **12** as shown in FIG. **2**.

Because the spring **90** pushes against the inner member **82**, the foot **110** automatically comes into, and stays in, engagement with the ground surface. Because the lug **96** is biased toward load supporting engagement with the teeth **94**, the leg **28** is always capable of supporting a lateral load when the ladder **10** tilts. In the event the ground is soft or uneven, the foot **110** remains in load supporting engagement with the ground because the spring **90** and lug mechanism **92** operate at all times when they are in their operating positions.

When it is desired to stow the ladder **10**, the handle **106** is turned to disengage the lug **96** and the inner member **82** is retracted into the outer member **80**, as by applying weight to the leg **28**. When the handle **86** reaches the J-slot **88**, the handle **86** is turned to lock the members **80**, **82** together. The leg **28** is then pivoted about the axis **60** into the fixture **70**.

Although this invention has been disclosed and described in its preferred forms with a certain degree of particularity, it is understood that the present disclosure of the preferred forms is only by way of example and that numerous changes in the details of construction and operation and in the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

I claim:

1. A ladder for placement on an underlying support surface comprising first and second longitudinal frame members defining a plane and a plurality of steps extending between the frame members and an auxiliary support comprising

a first support member;

means pivotally mounting the first support member on the ladder frame for movement between a first position generally parallel to the ladder and a second position defining an acute angle relative to the first ladder frame

member for supporting the ladder against tilting, the pivotal mounting means including

a spring biasing the first support member away from the first ladder frame member;

a bracket on the first frame member, a fastener connecting the first support member to the bracket for rotation about an axis and further comprising means limiting movement of the first support member about the axis to a predetermined arc comprising a lug on the first support member for engaging the bracket at the end of the predetermined arc;

a second support member having a ground engaging end and being mounted on the first support member for unimpeded sliding movement from an axially retracted position toward an axially extended position;

means moving the second support member toward the underlying support surface in response to a lack of resistance on the ground engaging end including

a spring biasing the second support member toward the axially extended position,

means locking, in response to an axial load on the support member, the second support member in a plurality of positions between the extended and retracted positions for preventing movement of the second support member toward the retracted position.

2. A ladder for placement on an underlying support surface comprising first and second longitudinal frame members defining a plane and a plurality of steps extending between the frame members and an auxiliary support comprising

a first support member connected to the first frame member and positionable in a support position at an acute angle relative to

a first support member connected to the first frame member and positionable in a support position at an acute angle relative to the first frame member for supporting the ladder against tilting;

means pivotally mounting the first support member on the ladder frame for movement between a first position generally parallel to the ladder and a second position defining an acute angle relative to the first ladder frame member for supporting the ladder against tilting, the pivotal mounting means including

a spring biasing the first support member away from the first ladder frame member,

a bracket on the first frame member, a fastener connecting the first support member to the bracket for rotation about an axis and further comprising means limiting movement of the first support member about the axis to a predetermined arc comprising a lug on

the first support member for engaging the bracket at the end of the predetermined arc;

a second support member having a ground engaging end and being mounted on the first support member for unimpeded sliding movement from an axially retracted position toward an axially extended position;

means movable between a first position holding the second support member in the axially retracted position and a second position freeing the second support member for movement toward the axially extended position;

3. The ladder of claim **1** wherein the locking means comprises a plurality of teeth and a lug cooperating between the first and second support members.

4. The ladder of claim **3** wherein the first support member is a tube, the second support member is inside the tube and provides the plurality of teeth and the lug is on the first support member.

5. The ladder of claim **4** wherein the lug comprises a pin having a wedge shaped end for engagement with the teeth mounted for movement toward and away from the teeth and a spring biasing the pin toward the teeth.

6. The ladder of claim **5** wherein the disabling means comprises means for rotating the lug and orienting the wedge shaped end out of engagement with the teeth.

7. The ladder of claim **6** wherein the spring biasing the second support member toward the axially extended position is inside the tube and abuts the second support member.

8. The ladder of claim **2** wherein the first member is a tube and wherein the holding means comprises a J-slot in the tube including a long leg extending axially along the tube and a short leg extending at an angle to the long leg at a location corresponding to the axially retracted position and a pin on the second support member extending through the J-slot.

9. The ladder of claim **3** further comprising means mounting the lug for movement into engagement with the teeth, means movably mounting the lug for movement to a inoperative position out of engagement with the teeth and means for maintaining the lug at the inoperative position, the manually operable means comprising the maintaining means.

10. The ladder of claim **9** wherein

the lug comprises a pin having a wedge shaped end for engagement with the teeth,

the means movably mounting the lug comprises means mounting the pin for axial movement between an operative lug position for engagement with the teeth and a retracted lug position away from the teeth and a spring biasing the pin toward the teeth, and

the maintaining means comprises means holding the lug in the retracted lug position.

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